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New Hampshire Code of Administrative Rules
Env-Ws 380

PART Env-Ws 380 FILTRATION AND DISINFECTION

Env-Ws 380.01 Abbreviations.

(a) "C" means residual disinfectant concentration in mg/l.

(b) "CT" or "Ctcalc" means the product of residual disinfectant concentration in mg/l determined before or at the first customer, and the corresponding disinfectant contact time in minutes, i.e., C x T.

(c) "CT99.9" means the CT value required for 99.9 per cent inactivation of giardia lamblia cysts as determined from Tables 380-2 through 380-9 in Env-Ws 380.22.

(d) "HPC" means heterotrophic plate count.

(e) "Mg/L" means concentration in milligrams per liter.

(f) "NTU" means nephelometric turbidity units.

(g) "T" means disinfectant contact time in minutes.

(h) "£" means "the sum of" in mathematical calculations.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.02 Definitions.

(a) "Backwash" means the process of reversing the flow of water back through the filter media to remove entrapped solids.

(b) "Coagulation" means a process using coagulant chemicals and mixing by which colloidal and suspended materials are agglomerated into flocs.

(c) "Comprehensive performance evaluation" (CPE) means a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices to identify factors that might be adversely impacting a plant's capability to achieve compliance and which emphasizes approaches that can be implemented without significant capital improvements.

(d) "Conventional filtration " means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in particulate removal.

(e) "Cryptosporidium" means a microorganism found in raw water which may cause illness after ingestion.

(f) "Diatomaceous earth filtration" means a process resulting in particulate removal in which a precoat cake of diatomaceous earth filter media is deposited on a support membrane, and while the water is filtered by passing through the cake on the support membrane, additional filter media is continuously added to the feed water to maintain the permeability of the filter cake.

(g) "Direct filtration" means a series of processes including coagulation and filtration but excluding sedimentation resulting in particulate removal.

(h) "Disinfectant contact time" or T in CT calculations means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration is measured.

(i) "Disinfection" means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

(j) "Disinfection profile" means a summary of daily giardia lamblia inactivation through the treatment plant.

(k) "Disinfection sequence" means that segment of a water supply main between point of disinfectant application and the first customer or subsequent point of disinfectant application.

(l) "Filter profile" means a graphic representation of individual filter performance, based on continuous turbidity measurements or total particle counts versus time for an entire filter run, from startup to backwash inclusively, that includes an assessment of filter performance while another filter is being backwashed.

(m) "Filtration" means a process for removing particulate matter from water by passage through porous media.

(n) "Flocculation" means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

(o) "Giardia lamblia" means a microorganism found in raw water which can cause illness after ingestion.

(p) “Ground water under the direct influence of surface water” means ground water under the direct influence of surface water as defined in 40 CFR 141.2, namely "any water beneath the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large-diameter pathogens such as giardia lamblia or cryptosporidium or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions."

(q) "High turbidity event" means a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

(r) "Inactivation" is the process by which a microorganism is altered so that the microorganism is unable to replicate.

(s) "Inactivation ratio" means the ratio of Ctcalc to CT99.9, Ctcalc/CT99.9.

(t) "Legionella" means a genus of bacteria, some species of which have caused a type of pneumonia called legionnaires disease.

(u) "Point of disinfectant application" is the point where the disinfectant is applied and water downstream of that point is not subject to recontamination by surface water runoff.

(v) "Residual disinfectant concentration", or C in CT calculations, means the concentration of disinfectant measured in mg/l in a representative sample of water.

(w) "Sedimentation" means a process for removal of solids before filtration by gravity or separation.

(x) "Slow sand filtration" means a process involving passage of raw water through a bed of sand at low velocity resulting in particulate removal by physical and biological mechanisms.

(y) "Surface water" means all water which is open to the atmosphere and subject to surface runoff.

(z) "Surface water/ground water under the direct influence of surface water (SW/GWUDISW)" system means a public water system using surface water or ground water under the direct influence of surface water as a source that is subject to the requirements of Env-Ws 380.

(aa) "Total inactivation ratio" means the sum of the inactivation ratios, represented by £(Ctcalc/CT99.9), calculated by adding together the inactivation ratio for each disinfection sequence in the case of a public water system which applies disinfectants at more than one point prior to the first customer.

(ab) "Uncovered finished water storage facility" means a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection and is open to the atmosphere.

(ac) "Unusual and unpredictable" means markedly contrasting with historical records, not indicative of generally predominating conditions, and not directly controllable by the water system operator.

(ad) "Virus" means a virus of fecal origin which is infectious to humans by waterborne transmission.

(ae) "Waterborne disease outbreak" means the occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment.

Source. (See Revision Note at chapter heading for Env-Ws 300) #6521, eff 6-4-97; amd by #7754, eff 8-21-02

Env-Ws 380.03 Purpose and Scope.

(a) The requirements in this section constitute national primary drinking water rules as specified in 40 CFR 141.1 which establish requirements for filtration and disinfection in addition to criteria under which filtration and disinfection are required elsewhere in this part.

(b) This section establishes criteria under which filtration shall be required as a treatment technique for public water systems supplied by a surface water source and public water systems supplied by a source of ground water under the direct influence of surface water.

(c) These rules establish treatment technique requirements in lieu of maximum contaminant levels for giardia lamblia, viruses, heterotrophic plate count bacteria, legionella, and turbidity.

(d) The owner of a public water system serving at least 10,000 people shall comply with the requirements in:

(1) Env-Ws 380.04;

(2) Env-Ws 380.27;

(3) Env-Ws 380.29; and

(4) Env-Ws 380.30.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300); amd by #7754, eff 8-21-02

Env-Ws 380.04 Filtration Applicability and Efficacy.

(a) Each public water system with a surface water source or a ground water source under the direct influence of surface water shall provide treatment of that source water that complies with these treatment technique requirements.

(b) The treatment technique requirements shall consist of installing and properly operating water treatment processes which reliably achieve the following:

(1) At least 99.9 percent removal and/or inactivation of giardia lamblia cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(2) At least 99.99 percent removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(c) A public water system using a surface water source or a source of ground water under the direct influence of surface water is considered to be in compliance with the requirements of paragraph (a) and (b) of this section if:

(1) It meets the requirements for avoiding filtration in Env-Ws 380.05 and the disinfection requirements in Env-Ws 380.15(f); or

(2) It meets the filtration requirements in Env-Ws 380.20 and the disinfection requirements in Env-Ws 380.15(g).

(d) Each public water system using a surface water source or a ground water source under the direct influence of surface water shall be operated by qualified personnel who meet the requirements of Env-Ws 367.

(e) A management plan shall be submitted to the division as part of any proposal for installation of filtration of surface water. The management plan shall demonstrate the financial and administrative capability of the water system to construct the filtration facilities and to operate the facilities on a continuous basis. Adequacy of this plan in light of the capabilities of the water system shall be a criterion for approval of the filtration proposal by the division.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.05 Criteria for Avoiding Filtration.

(a) The department shall determine which public water systems use groundwater under the direct influence of surface water.

(b) The division shall determine in the case of each public water system that uses surface water or groundwater under the direct influence of surface water whether filtration is required. This determination shall be based on the criteria in paragraphs (e) and (f) of this section.

(c) A public water system that uses a surface water source shall meet all of the conditions of (e) and (f) below, and shall be subject to (g) below, unless the division has determined, in writing, that filtration is required. A public water system that uses a ground water source under the direct influence of surface water shall meet all of the conditions of (e) and (f) below and shall be subject to (g) below, unless the division has determined, in writing, that filtration is required. If the division determines in writing, that filtration is required, the system shall install filtration and meet the criteria for filtered systems specified in Env-Ws 380.15(g) and Env-Ws 380.20.

(d) Within 18 months of the failure of a system using surface water or a ground water source under the direct influence of surface water to meet any one of the requirements of (e) and (f) below, the system shall install filtration and meet the criteria for filtered systems specified in Env-Ws 380.15(g) and Env-Ws 380.20.

(e) Criteria involving source water quality conditions shall be as follows:

(1) The fecal coliform concentration shall be equal to or less than 20/100 ml, or the total coliform concentration shall be equal to or less than 100/100 ml in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph shall be met.

(2) The turbidity level shall not exceed 5 NTU in representative samples of the source water immediately prior to the first or only point of disinfectant application unless:

a. Any such high turbidity event was caused by circumstances that were unusual and unpredictable; and

b. As a result of any such high turbidity event, there have not been more than two high turbidity events in the past 12 months during which the system served water to the public, or more than 5 high turbidity events in the past 120 months during which the system served water to the public, in which the turbidity level exceeded 5 NTU.

(f) Criteria involving site-specific conditions shall be as follows:

(1) The public water system shall meet the requirements of Env-Ws 380.15(f)(1), (2) and (3) at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and at least one of these failures was caused by circumstances that were unusual and unpredictable.

(2) The public water system shall meet the requirements of Env-Ws 380.15(f)(4) at all times during which the system serves water to the public.

(3) The public water system shall meet the requirements of Env-Ws 380.15(f)(5) at all times during which the system serves water to the public unless any such failure was caused by circumstances that were unusual and unpredictable.

(4) The public water system shall meet the requirements of Env-Ws 380.15(f)(6) on an ongoing basis unless that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

(5) The public water system shall maintain a watershed control program which minimizes the potential for contamination by giardia lamblia cysts and viruses in the source water. The

division shall determine whether the watershed control program is adequate to meet this goal with the following criteria:

a. The adequacy of a program to limit potential contamination by giardia lamblia cysts and viruses as follows:

1. The comprehensiveness of the watershed review;

2. The effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and

3. The extent to which the water system has maximized land ownership and/or controlled land use within the watershed.

b. The content of the watershed control program, which shall:

1. Characterize the watershed hydrology and land ownership;

2. Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

3. Monitor the occurrence of activities which may have an adverse effect on source water quality.

c. The capability of the public water system, through ownership and/or written agreements with landowners within the watershed, to control all human activities which may have an adverse impact on the microbiological quality of the source water.

d. The submission of an annual report to the division that:

1. Identifies any special concerns about the watershed and how they are being handled;

2. Describes activities in the watershed that affect water quality; and

3. Projects what adverse activities are expected to occur in the future and describes how the public water system expects to address them.

(6) The public water system shall be subject to an annual on-site inspection to assess the watershed control program and disinfection treatment process.

(7) The division shall conduct the on-site inspection, which shall include the following:

a. A review of the effectiveness of the watershed control program;

b. A review of the physical condition of the source intake and how well it is protected;

c. A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;

d. An inspection of the disinfection equipment for physical deterioration;

e. A review of operating procedures to ensure that the water system provides for uninterrupted disinfection;

f. A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and

g. Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

(8) The public water system shall not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system shall have been modified sufficiently to prevent another such occurrence, as determined by the division. A determination of the adequacy of modifications shall be based on design standards as set forth in Env-Ws 375.01.

(9) The public water system shall comply with the maximum contaminant level for total coliforms in Env-Ws 315.01 at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the division determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water. A determination of the adequacy of treatment of the source water shall be based on design standards as set forth in Env-Ws 375.01.

(10) The owner of a public water system shall comply with the requirements for total trihalomethanes (TTHM), haloacetic acid compounds (HAA5), bromate, chlorite, chlorine, chloramines, and chlorine dioxide as specified in Env-Ws 382.

(g) Treatment technique requirement violations under this part shall be as follows:

(1) A system shall be in violation of a treatment technique requirement if:

a. The system fails to meet any one of the criteria in (e) and (f) and/or the division has determined that filtration is required according to (b) above, in writing; and

b. The system fails to install filtration by the date specified in (d) above.

(2) A system that has not installed filtration shall be in violation of a treatment technique requirement if:

a. The turbidity level in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or

b. The system is identified by the division as a source of a waterborne disease outbreak based on an investigation of the timing of onset, pattern and duration of reported incidence, and identified coincidental operational events of the water system associated with the waterborne disease outbreak.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300); amd by #7754, eff 8-21-02

Env-Ws 380.06 - Env-Ws 380.14 - RESERVED

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.15 Disinfection.

(a) A public water system that uses a surface water source and does not provide filtration treatment shall provide the disinfection treatment specified in (f) below, unless the division determines that filtration is required in writing pursuant to Env-Ws 380.05.

(b) A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall provide disinfection treatment specified in (f) below unless the division has determined that filtration is required in writing according to section Env-Ws 380.05.

(c) A system that uses a surface water source that provides filtration treatment shall provide the disinfection treatment specified in (g) below.

(d) A system that uses a groundwater source under the direct influence of surface water and provides filtration treatment shall provide disinfection treatment as specified in (g) below.

(e) Failure to meet any requirement of this section shall be a treatment technique violation.

(f) Each public water system that does not provide filtration treatment shall provide disinfection treatment as follows:

(1) The disinfection treatment shall be sufficient to ensure at least 99.9 percent inactivation of giardia lamblia cysts and 99.99 percent inactivation of viruses, every day the system serves water to the public, except any one day each month.

(2) Each day a system serves water to the public, the public water system shall calculate the CT value(s) from the system's treatment parameters, using the procedure specified in Env-Ws 380.22(a)(5) and (6), and determine whether this value(s) is sufficient to achieve the specified inactivation rates for giardia lamblia cysts and viruses.

(3) If a system uses a disinfectant other than chlorine, the system shall demonstrate to the division, through the use of on-site disinfection challenge studies or other information, that CT99.9 values other than those specified in Tables 380-8 and 380-9 in Env-Ws 380.22(a)(6) or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by this paragraph.

(4) The disinfection system shall have redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system.

(5) The residual disinfectant concentration in the water entering the distribution system shall not be less than 0.2 mg/l for more than 4 hours.

(6) The residual disinfectant concentration in the distribution system shall be as follows:

a. The residual disinfectant concentration measured as total chlorine, combined chlorine, or chlorine dioxide shall not be undetectable in more than 5 percent of the samples each month, for any 2 consecutive months that the system serves water to the public.

b. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as HPC, is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement.

c. The value "V" in the following formula shall be calculated each month:

$$V = \frac{c + d + e}{a + b} \times 100$$

d. The terms in the formula in clause c. are as follows:

1. a = number of instances where the residual disinfectant concentration is measured;

2. b = number of instances where the residual disinfectant concentration is not measured but HPC is measured;

3. c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

4. d = number of instances where the residual disinfectant concentration is measured but not detected and where the HPC is >500/ml; and

5. e = number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

e. The value of "V" in clause c. shall not exceed 5 percent in one month for any 2 consecutive months.

(g) Each public water system that provides filtration treatment shall provide disinfection treatment as follows:

(1) The disinfection treatment shall be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent inactivation and/or removal of giardia lamblia cysts and at least 99.99 percent inactivation and/or removal of viruses.

(2) The residual disinfectant concentration in the water entering the distribution system shall not be less than 0.2 mg/l for more than 4 hours.

(3) The residual disinfectant concentration shall be as follows:

a. The residual disinfectant concentration measured as total chlorine, combined chlorine, or chlorine dioxide, shall not be undetectable in more than 5 percent of the samples each month, for any 2 consecutive months that the system serves water to the public.

b. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as HPC, shall be deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement.

c. The value "V" in the following formula shall be calculated each month:

$$V = \frac{c + d + e}{a + b} \times 100$$

d. The terms in the formula in clause c. are as follows:

1. a = number of instances where the residual disinfectant concentration is measured;

2. b = number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count is measured;

3. c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

4. d = number of instances where residual disinfectant concentration is measured but not detected and where the HPC is >500/ml; and

5. e = number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

e. The value of "V" in clause c. shall not exceed 5 percent in one month for any 2 consecutive months.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.16 - Env-Ws 380.19 - RESERVED

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.20 Filtration.

(a) A public water system that uses a surface water source or a ground water source under the direct influence of surface water, and does not meet all of the criteria in Env-Ws 380.05(e) and (f) for avoiding filtration, shall provide treatment consisting of both disinfection, as specified in Env-Ws 380.15(g), and filtration treatment which complies with the requirements of (b), (c), (d), or (e) below. Failure to meet any requirement of this section after the date specified in this paragraph shall be a treatment technique violation.

(b) For a public water system using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 0.5 NTU in at least 95% of the measurements taken each month. The turbidity level of representative samples of a system's filtered water shall not exceed 5 NTU.

(c) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month. The turbidity level of representative samples of a system's filtered water shall at no time exceed 5 NTU.

(d) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month. The turbidity level of representative samples of a system's filtered water shall at no time exceed 5 NTU.

(e) The owner of a public water system may use a filtration technology not listed in (b) through (d) above if the owner demonstrates to the department, using pilot plant studies, that:

(1) The alternate filtration technology, in combination with disinfection treatment that meets the requirements of Env-Ws 380.15(g), consistently achieves 99.9% removal of giardia lamblia, inactivation of giardia lamblia cysts, or both; and

(2) The treatment removes 99.99% of viruses, inactivates viruses, or both.

(f) For a system that makes the demonstration in (e) above, the requirements of (c) shall apply.

(g) The owner of a system owner serving at least 10,000 people shall:

(1) Meet the requirements for other filtration technologies set forth in Env-Ws 380.27(c); and

(2) Meet the turbidity requirements set forth in Env-Ws 380.29(b).

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300); amd by #7754, eff 8-21-02

Env-Ws 380.21 Analytical Requirements.

(a) The following analytical methods specified in Env-C 300 shall be used to comply with the requirements of Env-Ws 380.05, 380.15, and 380.20:

(1) Fecal coliform concentration;

(2) Total coliform concentration;

(3) Heterotrophic plate count;

(4) Residual disinfectant concentration;

(5) Turbidity;

(6) Temperature; and

(7) pH.

(b) Measurements for pH, temperature, turbidity, and residual disinfectant concentration shall be conducted by operators who are certified under Env-Ws 367.

(c) Measurements for total coliforms, fecal coliforms, and HPC shall be conducted by a laboratory certified to do such analysis by the New Hampshire department of environmental services under Env-C 300.

(d) Until laboratory certification criteria are developed for the analysis of HPC and fecal coliforms, any laboratory certified for total coliform analysis under chapter Env-C 300 is deemed certified for HPC and fecal coliform analysis.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.22 Monitoring Requirements.

(a) Monitoring requirements for systems that do not provide filtration shall be as follows:

(1) A public water system that uses a surface water source and does not provide filtration treatment shall monitor as specified in this paragraph unless the division has determined that filtration is required pursuant to Env 380.05, in which case the system shall monitor according to Env-Ws 375.10 until filtration is in place;

(2) A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall monitor as specified in this paragraph beginning 6 months after the division determines that the ground water source is under the direct influence of surface water unless the division has determined that filtration is

required pursuant to Env-Ws 380.05, in which case the system shall monitor according to Env-Ws 375.10 until filtration is in place; and

(3) Fecal coliform or total coliform density measurements shall be performed on representative source water samples immediately prior to the first or only point of disinfectant application as follows:

a. Each week the system serves water to the public, the system shall sample for fecal or total coliforms at the minimum frequency specified in Table 380-1:

Table 380-1
Sampling Non-filtered Systems for Coliforms

System Size (persons served) (shall be taken on separate days)	Samples/Week
<500	1
501 - 3,300	2
3,301 - 10,000	3
10,001 - 25,000	4
>25,000	5

b. One fecal or total coliform density measurement shall be made every day the system serves water to the public and the turbidity of the source water exceeds 1 NTU; and

c. The fecal or total coliform density measurements made according to clause b. shall count toward the weekly coliform sampling requirement required by clause a.

(4) Turbidity measurements as required by Env-Ws 380.05(e)(2) shall be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours, or more frequently, that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol recommended by the equipment manufacturer;

(5) The total inactivation ratio for each day that the system is in operation shall be determined based on the CT99.9 values in Tables 380-1 through Table 380-8 of this section, as appropriate; and

(6) The parameters necessary to determine the total inactivation ratio shall be monitored as follows:

a. The temperature of the disinfected water shall be measured at least once per day at each residual disinfectant concentration sampling point;

b. If the system uses chlorine, the pH of the disinfected water shall be measured at least once per day at each chlorine residual disinfectant concentration sampling point;

c. The disinfectant contact time(s) shall be determined for each day during peak hourly flow;

d. The residual disinfectant concentration(s) of the water before or at the first customer shall be measured each day during peak hourly flow;

e. If a system uses a disinfectant other than chlorine, the system shall demonstrate to the division, through the use of on-site disinfection challenge studies or other information that CT99.9 values other than those specified in Tables 380-8 and 380-9 in this section other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by Env-Ws 380.15(f)(1);

f. The CT values in Tables 380-2 through 380-7 shall be assumed to achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values shall be determined by linear interpolation. CT values between the indicated temperatures of different tables shall be determined by linear interpolation. If no interpolation is used, the CT99.9 value at the lower temperature and at the higher pH shall be used;

g. The CT values in Table 380-7 shall be assumed to achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated temperatures shall be determined by linear interpolation. If no interpolation is used, the CT99.9 value at the lower temperature for determining CT99.9 values between indicated temperatures shall be used; and

h. The CT values in Table 380-8 shall be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system shall demonstrate, based on on-site studies or other information that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures shall be determined by linear interpolation. If no interpolation is used, the CT99.9 value at the lower temperature for determining CT99.9 values between indicated temperatures shall be used.

(b) The CT values for giardia lamblia cysts inactivation by free chlorine at 0.5°C or lower shall be as stated in Table 380-2 below:

Table 380-2

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION
OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 0.5°C OR LOWER

	pH						
Residual (mg/l)	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
<0.4	137	163	195	237	277	329	390
0.6	141	168	200	239	286	342	407
0.8	145	172	205	246	295	354	422
1.0	148	176	210	253	304	365	437
1.2	152	180	215	259	313	376	451
1.4	155	184	221	266	321	387	464
1.6	157	189	226	273	329	397	477
1.8	162	193	231	279	338	407	489
2.0	165	197	236	286	346	417	500
2.2	169	201	242	297	353	426	511
2.4	172	205	247	298	361	435	522
2.6	175	209	252	304	368	444	533
2.8	178	213	257	310	375	452	543
3.0	181	217	261	316	382	460	552

(c) The CT values for giardia lamblia cysts inactivated by free chlorine at 5.0°C shall be as stated in Table 380-3 below:

Table 380-3

CT VALUES (CT 99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 5.0°C

	pH						
Free Residual (mg/l)	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
<0.4	97	117	139	166	198	236	279
0.6	100	120	143	171	204	244	291
0.8	103	122	146	175	210	252	301
1.0	105	125	149	179	216	260	312
1.2	107	127	152	183	221	267	320
1.4	109	130	155	187	227	274	329
1.6	111	132	158	192	232	281	337
1.8	114	135	162	196	238	287	345
2.0	116	138	165	200	243	294	353
2.2	118	140	169	204	248	300	361
2.4	120	143	172	209	253	306	368
2.6	122	146	175	213	258	312	375
2.8	124	148	178	217	263	318	382
3.0	126	151	182	221	268	324	389

(d) The CT values for giardia lamblia cysts inactivated by free chlorine at 10°C shall be as stated in Table 380-4 below:

Table 380-4

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 10°C

	pH						
Free Residual (mg/l)	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
<0.4	73	88	104	125	149	177	209
0.6	75	90	107	128	153	182	218
0.8	78	92	110	131	158	189	226
1.0	79	94	112	134	162	195	234
1.2	80	95	112	134	162	195	234
1.4	82	98	116	140	170	206	247
1.6	83	99	119	144	174	211	253
1.8	86	101	122	147	179	215	259
2.0	87	104	124	150	182	221	265
2.2	89	105	127	153	186	225	271
2.4	90	107	129	157	190	230	276
2.6	92	110	131	160	194	234	281
2.8	93	111	134	163	197	239	287
3.0	95	113	137	166	201	243	292

(e) The CT value for giardia lamblia cysts inactivated by free chlorine at 15°C shall be as stated in Table 380-5 below:

Table 380-5

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 15 ^{o} C

Free Residual (mg/l)	pH <6.0	6.5	7.0	7.5	8.0	8.5	<9.0
<0.4	49	59	71	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	64	76	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	60	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

(f) The CT value for giardia lamblia cysts inactivated by free chlorine at 20°C shall be as stated in Table 380-6 below:

Table 380-6

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 20°C

Free Residual (mg/l)	pH <6.0	6.5	7.0	7.5	8.0	8.5	<9.0
<0.4	49	59	71	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	64	76	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	61	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

(g) The CT for giardia lamblia cysts inactivated by free chlorine at 25°C shall be as stated in Table 380-7 below:

Table 380-7

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 25°C AND HIGHER

	pH						
Free Residual (mg/l)	<6.0	6.5	7.0	7.5	8.0	8.5	<9.0
<0.4	24	29	35	42	50	59	70
0.6	25	30	36	43	51	61	73
0.8	26	31	37	44	53	63	75
1.0	26	31	37	45	54	65	78
1.2	27	32	38	46	55	67	80
1.4	27	33	39	47	57	69	82
1.6	28	33	40	48	58	70	84
1.8	29	34	41	49	60	72	86
2.0	29	35	41	50	61	74	88
2.2	30	35	42	51	62	75	90
2.4	30	36	43	52	63	77	92
2.6	31	37	44	53	65	78	94
2.8	31	37	45	54	66	80	96
3.0	32	38	46	55	67	81	97

(h) The CT values for giardia lamblia cysts inactivated by chlorine dioxide and ozone shall be as stated in Table 380-8, below:

Table 380-8

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY CHLORINE DIOXIDE AND OZONE

	Temperature					
	≤1 °C	5 °C	10 °C	15 °C	20 °C	≥25 °C
Chlorine dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.48

(i) The CT values for giardia lamblia cysts inactivated by chloramines at pH values 6 to 9 shall be as stated in Table 380-9 below:

Table 380-9

CT VALUES (CT99.9) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY CHLORAMINES AT pH VALUES 6 TO 9

Temperature					
≤1 °C	5 °C	10 °C	15 °C	20 °C	≥25 °C
3,800	2,200	1,850	1,500	1,100	750

(7) The total inactivation ratio shall be calculated as follows:

a. If the system uses only one point of disinfectant application, the system shall determine the total inactivation ratio based on either of the following two methods:

1. One inactivation ratio, Ctcalc/CT99.9, shall be determined before or at the first customer during peak hourly flow and if the Ctcalc/CT99.9 > 1.0, the 99.9 percent Giardia lamblia inactivation requirement has been achieved; or

2. Successive Ctcalc/CT99.9 values, representing sequential inactivation ratios, shall be determined between the point of disinfectant application and a point before or at the first customer during peak hourly flow.

b. Under a.2., the following method shall be used to calculate the total inactivation ratio:

1. The (Ctcalc/CT99.9) shall be determined for each sequence;

2. The (Ctcalc/CT99.9) values shall be added together (£(Ctcalc/CT99.9)); and

3. If £(Ctcalc/CT99.9) > 1.0, the 99.9 percent giardia lamblia inactivation requirement shall have been achieved.

c. If the system uses more than one point of disinfectant application before or at the first customer, the system shall determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The Ctcalc/CT99.9 value of each sequence and £(Ctcalc/CT99.9) shall be calculated using the method in paragraph b.1. through 3. Of this section to determine if the system is in compliance with Env-Ws 380.15(f).

(8) Monitoring of residual disinfectant concentration of the water entering the distribution system shall be as follows:

a. The residual disinfectant concentration shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours shall be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment;

b. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed in Table 380-10 below:

Table 380-10
Distribution Disinfectant Residual Samples For Unfiltered Systems

System by population	Samples/day
<500	1
501 - 1,100	2
1,001 - 2,500	3
2,501 - 3,300	4

c. The day's samples taken according to b. shall not be taken at the same time; and

d. If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system shall take a grab sample every 4 hours until the residual concentration is equal to or greater than 0.2 mg/l.

(9) Monitoring of residual disinfectant in the distribution system shall be as follows:

a. The residual disinfectant concentration shall be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in Env-Ws 325.02. Except that a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, may take disinfectant residual samples at points other than the total coliform sampling points if the division determines that such points are more representative of disinfected water quality within the distribution system.

b. The division shall make this determination based on the following criteria:

1. The general hydraulics of the distribution system based on water demand patterns;

2. The relative quantity of water supplied from the various water sources;

3. The scheduling of supply from pumped sources; and

4. Historic disinfectant concentration at various locations in the distribution system as determined from water supply records.

c. Heterotrophic bacteria, measured as heterotrophic plate count may be measured in lieu of residual disinfectant concentration.

(b) Monitoring requirements for systems using filtration treatment shall be as follows:

(1) A public water system that uses a surface water source or a ground water source under the influence of surface water and provides filtration treatment shall monitor in accordance with this paragraph;

(2) Turbidity measurements shall be as follows:

a. Measurement as required by Env-Ws 380.20 shall be performed on representative samples of the system's filtered water every 4 hours, or more frequently, that the system serves water to the public;

b. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol recommended by the equipment manufacturer;

c. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the division shall reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance;

d. For systems serving 500 or fewer persons, the division shall reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the division determines that less frequent monitoring is sufficient to indicate effective filtration performance;

e. The determination of sufficiency of less frequent monitoring in paragraphs c. and d. shall be based on the following criteria:

1. The capability of the water system to maintain residual disinfectant concentration in water entering the distribution system in accordance with Env-Ws 380.15(g)(2);

2. The capability of the water system to maintain detectable residual disinfectant concentration in the distribution system or otherwise comply with the requirements of Env-Ws 380.15(g)(3); and

3. The capability of the water system to meet the turbidity requirements of Env-Ws 380.20.

(3) The residual disinfectant concentration of the water entering the distribution system shall be monitored as follows:

a. The residual shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours shall be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment;

b. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies each day prescribed in Table 380-11 below:

Table 380-11

Distribution Disinfectant Residual Sampling For Filtered Systems

System size by population	Samples/day
<500	1
501 - 1,000	2
1,001 - 2,500	3
2,501 - 3,300	4

c. The day's samples taken according to paragraph b. shall not be taken at the same time; and

d. If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system shall take a grab sample every 4 hours until the residual disinfectant concentration is equal to or greater than 0.2 mg/l.

(4) The residual disinfectant concentration in the distribution system shall be as follows:

a. The residual disinfectant concentration shall be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in Env-Ws 325.02, except that a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, may take disinfectant residual samples at points other than the total coliform sampling points if the division determines that such points are more representative of disinfected water quality within the distribution system;

b. The division shall make this determination based on the following criteria:

1. The general hydraulics of the distribution system based on water demand patterns;

2. The relative quantity of water supplied from the various water sources;

3. The scheduling of supply from pumped sources; and

4. Historic disinfectant concentration at various locations in the distribution system as determined from water supply records.

b. Heterotrophic bacteria, measured as heterotrophic plate count may be measured in lieu of residual disinfectant concentration.

Source. (See Revision Note at chapter heading for Env-Ws 300) #6521, eff 6-4-97

Env-Ws 380.23 - Env-Ws 380.24 - RESERVED

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.25 Reporting and Recordkeeping Requirements.

(a) Reporting and recordkeeping requirements for systems that do not provide filtration shall be as follows:

(1) A public water system that uses a surface water source and does not provide filtration treatment shall report monthly to the division the information specified in this paragraph unless the division has determined that filtration is required in writing pursuant to Env-Ws 380.05 (b), in which case the system shall report according to Env-Ws 375.10 until filtration is in place;

(2) A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall report monthly to the division the information specified in this paragraph beginning 6 months after the division determines that the ground water source is under the direct influence of surface water unless the division has

determined that filtration is required in writing pursuant to Env-Ws 380.05(b), in which case the system shall report according to Env-Ws 375.10 until filtration is in place;

(3) Source water quality information shall be reported to the division within 10 days after the end of each month that the system serves water to the public as follows:

a. The cumulative number of months for which results are reported;

b. The number of fecal and/or total coliform samples, whichever are analyzed during the month, the dates of sample collection, and the dates when the turbidity level exceeded 1 NTU. If a system monitors for both fecal coliforms and total coliforms, only fecal coliforms shall be reported;

c. The number of samples during the month that had equal to or less than 20/100 ml fecal coliforms and/or equal to or less than 100/100 ml total coliforms, whichever are analyzed;

d. The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous 6 months the system served water to the public;

e. The cumulative number of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous 6 months the system served water to the public;

f. The percentage of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than l00/l00 ml total coliforms, whichever are analyzed, during the previous 6 months the system served water to the public;

g. The maximum turbidity level measured during the month, the date(s) of occurrence for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the division;

h. For the first 12 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after one year of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 12 months the system served water to the public; and

i. For the first 120 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 120 months the system served water to the public.

(4) Disinfection information specified in Env-Ws 380.22(a) shall be reported to the division within 10 days after the end of each month the system serves water to the public as follows:

a. For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system;

b. The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the division was notified of the occurrence;

c. The daily residual disinfectant concentration(s), in mg/l, and disinfectant contact time(s), in minutes, used for calculating the CT value(s);

d. If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection;

e. The daily measurement(s) of water temperature in °C following each point of disinfection;

f. The daily Ctcalc and Ctcalc/CT99.9 values for each disinfectant measurement or sequence and the sum of all Ctcalc/CT99.9 values, £(Ctcalc/CT99.9), before or at the first customer;

g. The daily determination of whether disinfection achieves adequate giardia cyst and virus inactivation, i.e., whether (Ctcalc/CT99.9) is at least 1.0 or, where disinfectants other than chlorine are used, other indicator conditions are met; and

h. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to Env-Ws 325:

1. Number of instances where the residual disinfectant concentration is measured;

2. Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count is measured;

3. Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

4. Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;

5. Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml; and

6. For the current and previous month the system served water to the public, the value of "V" calculated in Env-Ws 380.15(e)(6).

i. A system need not report the data listed in paragraphs (a)(4)a. and c. through f. of this section if all data listed in paragraphs (a)(4)a. through h. of this section remain on file at the system, and the division determines that:

1. The system has submitted to the division all the information required by (a)(4)a. through h. of this section for at least 12 months; and

2. The system is not required to provide filtration treatment.

(5) No later than 10 days after the end of each calendar year, each system shall provide to the division a report which summarizes its compliance with all watershed control program requirements specified in Env-Ws 380.05(f)(5);

(6) No later than 10 days after the end of each calendar year, the division shall provide a copy of its report on the on-site inspection conducted during that year pursuant to Env-Ws 380.05(f)(6) to the public water system;

(7) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, shall report that occurrence to the division as soon as possible, but no later than by the end of the next business day after such discovery;

(8) If at any time the turbidity exceeds 5 NTU, the system shall inform the division as soon as possible, but no later than the end of the next business day after such discovery; and

(9) If at any time the residual falls below 0.2 mg/l in the water entering the distribution system, the system shall notify the division as soon as possible, but no later than by the end of the next business day after such discovery. The system also shall notify the division by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

(b) A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment shall report monthly to the division the information specified in this paragraph as follows:

(1) Turbidity measurements as required by Env-Ws 380.22(b)(2) shall be reported within 10 days after the end of each month the system serves water to the public as follows:

a. The total number of filtered water turbidity measurements taken during the month;

b. The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in Env-Ws 380.20 for the filtration technology being used; and

c. The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

(2) Disinfection information specified in Env-Ws 380.22(b) shall be reported to the division within 10 days after the end of each month the system serves water to the public as follows:

a. For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system;

b. The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the division was notified of the occurrence; and

c. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to Env-Ws 325:

1. Number of instances where the residual disinfectant concentration is measured;

2. Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count is measured;

3. Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

4. Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;

5. Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml; and

6. For the current and previous month the system serves water to the public, the value of "V" calculated in Env-Ws 380.15(g)(3)c. and d.;

d. A system need not report the data listed in (b)(2)a. of this section if all data listed in paragraphs (b)(2)a. through (b)(2)c. of this section remain on file at the system and the division determines that the system has submitted all the information required by paragraphs (b)(2)a. through c. of this section for at least 12 months;

(3) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, shall report that occurrence to the division as soon as possible, but no later than by the end of the next business day after such discovery;

(4) If at any time the turbidity exceeds 5 NTU, the system shall inform the division as soon as possible, but no later than the end of the next business day after such discovery; and

(5) If at any time the residual falls below 0.2 mg/l in the water entering the distribution system, the system shall notify the division as soon as possible, but no later than by the end of the next business day after such discovery. The system also shall notify the division by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.26 Variances and Exemptions.

(a) No variances from the requirements of Env-Ws 380 shall be permitted.

(b) No exemptions from the requirements of Env-Ws 380.15(f)(5) and Env-Ws 380.15(g)(2) shall be permitted.

Source. #5098, eff 3-18-91, EXPIRED 3-18-97

New. #6521, eff 6-4-97 (See Revision Note at chapter heading for Env-Ws 300)

Env-Ws 380.27 Enhanced Filtration and Disinfection.

(a) The requirements in this section shall apply to SW/GWUDISW systems serving at least 10,000 people unless otherwise specified in this part.

(b) The requirements in this section shall establish or extend treatment technique requirements in lieu of maximum contaminant levels for the following contaminants:

(1) Giardia lamblia;

(2) Viruses;

(3) Heterotrophic plate count bacteria;

(4) Legionella;

(5) Cryptosporidium; and

(6) Turbidity.

(c) The owner of a SW/GWUDISW system serving at least 10,000 people shall provide treatment of the source water that complies with treatment technique requirements identified in (d) below, and as specified in Env-Ws 380.04.

(d) The treatment technique requirements shall consist of installing and properly operating water treatment processes as follows:

(1) For a filtered system, at least 99%, or 2-log removal of cryptosporidium shall be achieved between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before, or at the first customer;

(2) For an unfiltered system, control of cryptosporidium shall be achieved by using the watershed control plan as specified in Env-Ws 380.05(f); and

(3) Compliance with the profiling and benchmark requirements shall be achieved under the provisions of Env-Ws 380.28.

(e) The owner of a public water system subject to the requirements of this section shall be in compliance with Env-Ws 380.03(a) if:

(1) The system meets the requirements for avoiding filtration set forth in Env-Ws 380.05 and (g) through (j) below and the disinfection requirements set forth in Env-Ws 380.15 and Env-Ws 380.28; or

(2) The system meets the applicable filtration requirements set forth in Env-Ws 380.20 or Env-Ws 380.29and the disinfection requirements in Env-Ws 380.15 and Env-Ws 380.28.

(f) A system owner shall not construct an uncovered finished water storage facility.

(g) In addition to the requirements of Env-Ws 380.05, the owner of a public water system subject to the requirements of this section that does not provide filtration shall:

(1) Comply with the site-specific conditions specified in Env-Ws 380.05(f); and

(2) Maintain the watershed control program under Env-Ws 380.05(f)(5) to minimize the potential for contamination by cryptosporidium oocysts in the source water.

(h) The watershed control program identified in (g) above, shall, for cryptosporidium:

(1) Identify watershed characteristics and activities which might have an adverse effect on source water quality; and

(2) Monitor the occurrence of activities which might have an adverse effect on source water quality.

(i) During the on-site inspection conducted under Env-Ws 380.05(f)(7), the department shall use the criteria specified in Env-Ws 380.05(f)(5)a. through d. to determine whether the watershed control program established under Env-Ws 380.05(f)(5) is adequate.

Source. #7754, eff 8-21-02

Env-Ws 380.28 Disinfection Profiling and Benchmarking.

(a) The owner of a public water system subject to the requirements of Env-Ws 380.27 shall determine for the system:

(1) The TTHM annual average using the procedure specified in (c) below; and

(2) The HAA5 annual average using the procedure specified in (d) below.

(b) The HAA5 annual average shall be the average of the quarterly averages of 4 consecutive quarters of monitoring identified in (c) and (d), below.

(c) The TTHM annual average shall be calculated during the same period as the HAA5 annual average and be based on the following:

(1) A system owner collecting data under the provisions of 40 CFR 141 Subpart M, July 1, 2000 edition shall use the results of the samples collected during the last 4 quarters of required monitoring;

(2) A system owner using HAA5 occurrence data that meet the provisions of (d)(2) below, shall use TTHM data collected at the same time under the requirements of Env-Ws 317.70 and Env-Ws 327.70; and

(3) A system owner using HAA5 occurrence data that meet the provisions of (d)(1) or (2) below, shall use TTHM data collected at the same time under the provisions of Env-Ws 317.70 and Env-Ws 327.70.

(d) The HAA5 annual average shall be the annual average during the same period as the TTHM annual average, and be based on the following:

(1) A system owner collecting data under the provisions of 40 CFR 141 Subpart M, July 1, 2000 edition, shall use the results of the samples collected during the last 4 quarters of required monitoring; and

(2) A system owner collecting 4 quarters of HAA5 occurrence data that meets the routine monitoring sample number and location requirements for TTHM set forth in Env-Ws 317.70 and Env-Ws 327.70, and the handling and analytical method requirements of Env-C 300, shall use those data to determine whether the requirements of this section apply.

(e) A water system owner who fails to collect the HAA5 data specified in (d) above shall:

(1) Conduct monitoring for HAA5 that meets the routine monitoring sample number and location requirements for TTHM set forth in Env-Ws 317.70 and Env-Ws 327.70 and the handling and analytical method requirements of Env-C 300 to determine the HAA5 annual average and whether the requirements of (f) below apply; or

(2) Comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with (f) below.

(f) A system owner may submit to the department a written request that the department approve a more representative annual data set than the data set determined under (c) or (d) above, for the purpose of determining applicability of the requirements of this section.

(g) The written request shall include:

(1) The system name;

(2) The system EPA number;

(3) At least 12 months of TTHM and HAA5 results; and

(4) An explanation as to why the results submitted are a representative data set.

(h) The department shall approve the data set if it determines that the data set is equivalent to the data set collected under the criteria specified in (c) or (d) above.

(i) A system owner shall submit the following data to the department:

(1) A system owner collecting TTHM and HAA5 data under the provisions of 40 CFR 141 Subpart M, July 1, 2000 edition, as required by (c)(1) and (d)(1) above, shall submit the results of the samples collected during the last 12 months of required monitoring to the department;

(2) A system owner collecting 4 consecutive quarters of HAA5 occurrence data that meet the routine monitoring sample number and location for TTHM in Env-Ws 317.70 and Env-Ws 327.70 and the handling and analytical method requirements of Env-C 300 as allowed by (c)(2) and (d)(2) above, shall submit that data to the department;

(3) A system owner conducting monitoring for HAA5 using the monitoring requirements specified by (c)(3) and (e)(1) above shall submit TTHM and HAA5 data to the department; and

(4) A system owner electing to comply with all other provisions of this paragraph as if the HAA5 monitoring had been conducted and the results required compliance with this section, as allowed under (e)(2) above, shall notify the department in writing of the election.

(j) Until the department has approved the data identified in (i) above, the system owner shall conduct monitoring for HAA5 using the monitoring requirements specified under (d)(3) above.

(k) A system having either a TTHM annual average greater than or equal to 0.064 mg/L or an HAA5 annual average greater than or equal to 0.048 mg/L during the same monitoring period specified in (c) above shall conduct disinfection profiling as follows:

(1) A system owner shall develop a disinfection profile of its disinfection practice for a period of up to 3 years;

(2) A system owner shall monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation, expressed as log inactivation, for each day of operation, based on the CT99.9 values specified in Env-Ws 380.22 Tables 380-2 through 380-9 as appropriate, through the entire treatment plant;

(3) A system owner shall conduct the monitoring required in (2), above as follows:

a. A system with a single point of disinfectant application prior to entrance to the distribution system shall conduct the monitoring in (4)a. through d. below; and

b. A system with more than one point of disinfectant application shall conduct the monitoring in paragraphs (4) a. through d. below for each disinfection segment;

(4) A system owner shall monitor the parameters necessary to determine the total inactivation ratio, using analytical methods described in Env-Ws 380.21, as follows:

a. The temperature of the disinfected water shall be measured at least once per day at each residual disinfectant concentration sampling point during peak hourly flow;

b. If the system uses chlorine, the pH of the disinfected water shall be measured at least once per day at each chlorine residual disinfectant concentration sampling point during peak hourly flow;

c. The disinfectant contact time(s) (T) shall be determined for each day during peak hourly flow; and

d. The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfection shall be measured each day during peak hourly flow.

(l) A system owner may submit a written request to the department to use existing operational data in lieu of the monitoring conducted under the provisions of (k)(2) above.

(m) The written request shall include the following:

(1) The water system name;

(2) The water system EPA number;

(3) The most recent operational data for the past 3 years; and

(4) A profile generated using the operational data specified in (3) above.

(n) The data specified in (k) above shall be representative of giardia lamblia inactivation through the entire treatment plant and not just of certain treatment segments.

(o) The department shall determine whether the operational data is substantially equivalent to data collected under the provisions of (k)(2).

(p) Until the department approves the request identified in (l) above, the system owner shall conduct monitoring under the provisions of (k)(2), above.

(q) In addition to the monitoring conducted under the provisions of (k)(2) above, to develop the disinfection profile, the system owner may elect to meet the following:

(1) In addition to the disinfection profile generated under (k)(2) above, the owner of a public water system that has existing operational data may use the data to develop a disinfection profile for additional years;

(2) A system owner may use the additional yearly disinfection profiles to develop a benchmark under the provisions of (u) below; and

(3) The data shall be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

(r) A system owner shall calculate the total inactivation ratio as follows:

(1) If a system uses only one point of disinfectant application, the system owner shall determine the total inactivation ratio for the disinfection segment by:

a. Determining one CTcalc/CT99.9 (inactivation ratio) before or at the first customer during peak hourly flow; or

b. Determining successive sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow;

(2) Under b. above, a system owner shall calculate the £ CTcalc/CT99.9 (total inactivation ratio) by determining the inactivation ratios for each sequence and then adding the inactivation ratio values together to determine the total inactivation ratio;

(3) If a system uses more than one point of disinfectant application before the first customer, the system owner shall determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow and the inactivation ratio value of each segment and the total inactivation ratio shall be calculated using the method in (1) above; and

(4) The system owner shall determine the total logs of inactivation by multiplying the value calculated in (1) or (3) above by 3.0.

(s) The owner of a system that uses either chloramines or ozone for primary disinfection shall calculate the logs of inactivation for viruses.

(t) The system owner shall retain disinfection profile data in the form of a graph or as a spreadsheet and have the data available when the department conducts a sanitary survey pursuant to Env-Ws 306.

(u) Disinfection benchmarking shall be conducted as follows:

(1) The owner of a system required to develop a disinfection profile under the provisions of this section shall consult with the department prior to making a significant change to the system's disinfection practice;

(2) Significant changes to disinfection practice shall include:

a. Changes to the point of disinfection;

b. Changes to the disinfectant(s) used in the treatment plant;

c. Changes to the disinfection process; or

d. Any other disinfection modification identified by the department; and

(3) The owner of a system shall submit the following information to the department as part of the consultation process identified in (1) above:

a. A description of the proposed change;

b. The disinfection profile for giardia lamblia, and, if necessary, viruses, under (k) above and the disinfection benchmark as required by (w) below; and

c. An analysis of how the proposed change will affect the current levels of disinfection.

(v) The department shall respond to the request in writing and shall approve the change to the disinfectant practice if it finds that such change complies with department rules and statutes.

(w) The owner of a system receiving department approval to modify the system's disinfection practice shall calculate the disinfection benchmark using the procedure specified in (1) or (2) below:

(1) For each year of profiling data collected and calculated under (k) above, the system owner shall:

a. Determine the lowest average monthly giardia lamblia inactivation in each year of profiling data; and

b. Determine the average giardia lamblia inactivation for each calendar month for each year of profiling data by dividing the sum of daily giardia lamblia logs of inactivation by the number of values calculated for that month; or

(2) The disinfection benchmark shall be the lowest monthly average value, for systems with one year of profiling data, or the average of lowest monthly average values, for systems with more than one year of profiling data, of the monthly logs of giardia lamblia inactivation in each year of profiling data.

(x) A system owner who uses chloramines or ozone for primary disinfection shall:

(1) Calculate the disinfection benchmark for viruses using the method in (k) above; and

(2) Submit the information specified in (u)(3) above, to the department within 10 days of obtaining the information.

Source. #7754, eff 8-21-02

Env-Ws 380.29 Additional Filtration Requirements for Systems Serving Greater than 10,000 Persons.

(a) The owner of a public water system serving greater than 10,000 persons that does not meet all of the criteria for avoiding filtration shall provide:

(1) Treatment consisting of disinfection, as specified in Env-Ws 380.15(g); and

(2) Filtration treatment as specified in (b) or (c) below or Env-Ws 380.20 (c) or (d).

(b) A water system serving greater than 10,000 persons and using conventional filtration treatment or direct filtration shall achieve the following:

(1) The turbidity level of representative samples of the system's filtered water shall be less than or equal to 0.3 NTU in at least 95% of the measurements taken each month; and

(2) The turbidity level of representative samples of a system's filtered water shall not exceed 1 NTU.

(c) A system using lime softening may acidify representative samples prior to analysis.

(d) The owner of a water system using filtration treatment other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration may submit a written request to the department to use a filtration treatment not listed in (b) above or in Env-Ws 380.20 (c) or (d).

(e) The written request shall include:

(1) The system name;

(2) The system EPA number;

(3) A description of the proposed alternative filtration equipment, disinfection treatment, or both; and

(4) Pilot plant studies conducted to support the use of the proposed alternative treatment.

(f) The department shall respond to the request in writing and shall approve the request if:

(1) The proposed alternative treatment meets the requirements of Env-Ws 380.15(g); and

(2) The proposed alternative treatment consistently achieves the following:

a. Not less than 99.9% removal or inactivation of giardia lamblia cysts;

b. Not less than 99.99% removal or inactivation of visuses; and

c. Not less than 99% removal of cryptosporidium oocysts.

(g) After installation of treatment, the system shall meet the turbidity requirements specified in Env-Ws 380.20(c).

(h) After installation of treatment, the water system shall consistently achieve the requirements in (f)(2), above.

(i) In addition to monitoring required by Env-Ws 380.22, a public water system owner providing conventional filtration or direct filtration shall:

(1) Conduct continuous monitoring of turbidity for each individual filter using an approved method specified in Env-Ws 380.21; and

(2) Calibrate turbidimeters using the procedure specified by the manufacturer.

(j) A public water system owner shall record the results of individual filter monitoring every 15 minutes.

(k) If there is a failure in the continuous turbidity monitoring equipment, the system owner shall conduct grab sampling every 4 hours in lieu of continuous monitoring until the turbidimeter is repaired and back on-line.

(l) A system owner shall repair the monitoring equipment within 5 business days of the failure.

Source. #7754, eff 8-21-02

Env-Ws 380.30 Additional Reporting and Recordkeeping Requirements for Systems Serving Greater Than 10,000 Persons.

(a) In addition to the reporting and recordkeeping requirements in Env-Ws 380.25, the owner of a public water system serving greater than 10,000 persons providing conventional filtration treatment or direct filtration, shall report monthly to the department the information specified in (c) and (e) below.

(b) In addition to the reporting and recordkeeping requirements in Env-Ws 380.25, the owner of a public water system that provides filtration approved under Env-Ws 380.29 (b) through (h) shall report monthly to the department the information specified in (c) below.

(c) A system owner shall report turbidity measurements required by Env-Ws 380.29(b) through (h) to the department within 10 days after the end of each month the system serves water to the public.

(d) The reporting in (c) above, shall be in lieu of the reporting specified in Env-Ws 380.25(b)(1).

(e) The turbidity measurement report identified in (c) above, shall include:

(1) The total number of filtered water turbidity measurements taken during the month;

(2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in Env-Ws 380.29(b) and Env-Ws 380.29(f); and

(3) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the department under Env-Ws 380.29(d).

(f) A system owner shall maintain the results of individual filter monitoring taken under Env-Ws 380.29 (h) through (l) for at least 3 years.

(g) A system owner shall report to the department that it has conducted individual filter turbidity monitoring under Env-Ws 380.29 (h) through (l) within 10 days after the end of each month the system serves water to the public.

(h) A system owner shall report to the department individual filter turbidity measurement results taken under Env-Ws 380.29 (h) through (l) within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions identified in (l)(1) through (l)(8) below.

(i) The owner of a system that uses lime softening may submit to the department a written request to exceed the levels specified in (l)(1) through (l)(8) below.

(j) The written request shall include:

(1) The system name;

(2) The system EPA number; and

(3) Documentation that the turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(k) The department shall respond to the request in writing and shall approve the request if the system demonstrates that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(l) The system owner shall report to the department individual filter turbidity as follows:

(1) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in 2 consecutive measurements taken 15 minutes apart, the system owner shall report:

a. The filter number;

b. The turbidity measurement; and

c. The date(s) and times on which the exceedance occurred;

(2) If the system is not able to identify an obvious reason for the abnormal filter performance:

a. A filter profile for the filter within 7 days of the exceedance; and

b. Report to the department that the filter profile has been produced;

(3) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in 2 consecutive measurements taken 15 minutes apart at the end of the first 4 hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system owner shall report to the department the:

a. Filter number;

b. Turbidity measurement; and

c. Date(s) and times on which the exceedance occurred;

(4) A system owner shall produce:

a. A filter profile for the filter within 7 days of the exceedance if the system is not able to identify a reason for the abnormal filter performance; and

b. Report to the department that the filter profile has been produced;

(5) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in 2 consecutive measurements taken 15 minutes apart at any time in each of 3 consecutive months, the system owner shall report to the department the:

a. Filter number;

b. Turbidity measurement; and

c. Date(s) and times on which the exceedance occurred;

(6) The system owner identified in (5) above, shall

a. Conduct an assessment of the filter within 14 days of the exceedance; and

b. Report to the department that the assessment was conducted;

(7) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in 2 consecutive measurements taken 15 minutes apart at any time in each of 2 consecutive months, the system owner shall report to the department the:

a. Filter number;

b. Turbidity measurement; and

c. Date(s) on which the exceedance occurred;

(8) The system owner identified in (7) above shall:

a. Arrange for a CPE by the department, no later than 30 days following the exceedance; and

b. Have the evaluation completed and submitted to the department no later than 90 days following the exceedance.

(m) A system owner in (l)(8) above may submit to the department a written request to use a third party to perform the CPE.

(n) The written request shall include:

(1) The system name;

(2) The system EPA number; and

(3) The name, address, and telephone number of the person performing the CPE.

(o) The department shall respond to the request in writing and shall approve the third party request if the third party meets the criteria set forth in Env-Ws 600.

(p) The assessment required under (l)(6) above, shall include the following:

(1) An assessment of filter performance;

(2) A development of a filter profile;

(3) An identification and prioritization of factors limiting filter performance;

(4) An assessment of the applicability of corrections; and

(5) A filter assessment report.

(q) A CPE required in (l)(8) above, shall include the following:

(1) An assessment of plant performance;

(2) An evaluation of major unit processes;

(3) An identification and prioritization of performance limiting factors; and

(4) An assessment of the applicability of comprehensive technical assistance.

(r) If at any time the turbidity level exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system owner shall notify the department as soon as possible but no later than 24 hours after the exceedance is known.

(s) If at any time the turbidity level in representative samples of filtered water exceed the maximum level set by the department under Env-Ws 380.29(f) for filtration treatments other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system owner shall inform the department as soon as possible, but no later than 24 hours after the exceedance is known.

Source. #7754, eff 8-21-02